Trend Study 22R-1 & 2-03

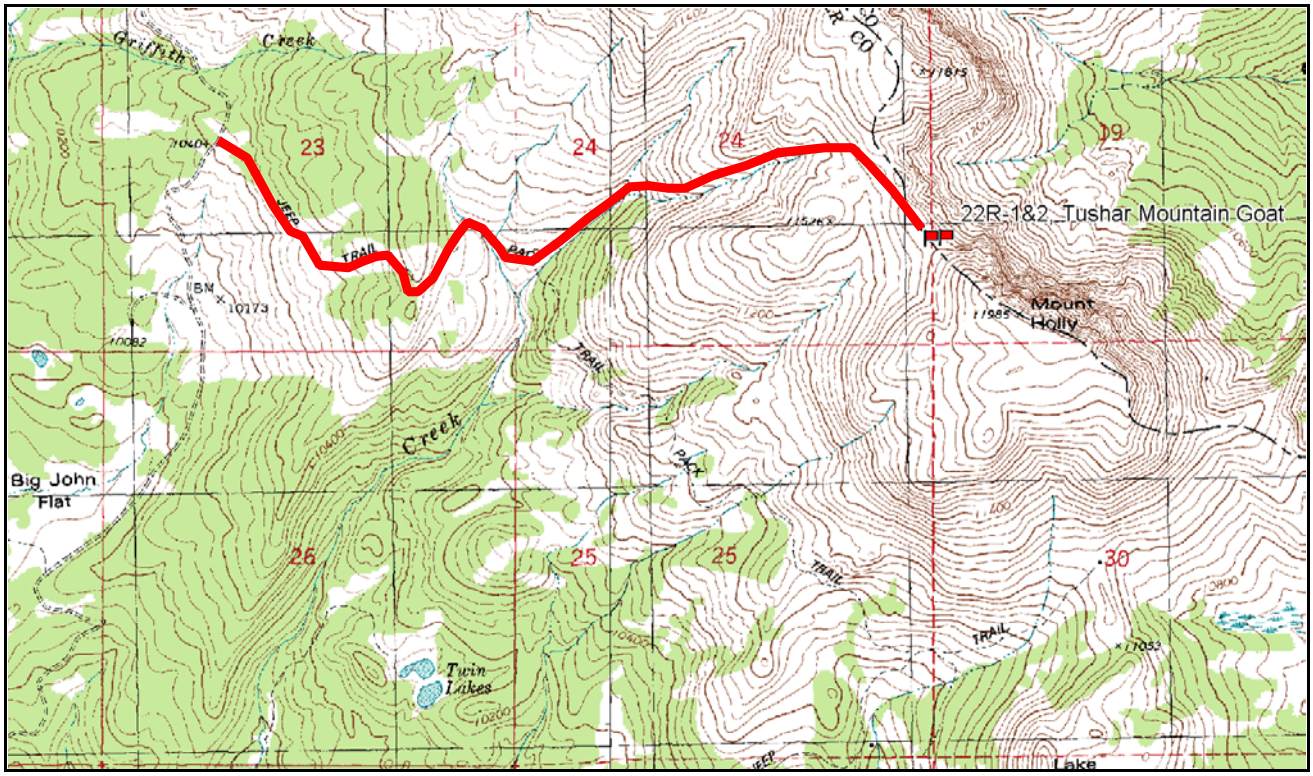
Study site name: Tushar Mountain Goat # 1 & 2 . Vegetation type: Alpine Tundra .

Compass bearing: frequency baseline 0 degrees magnetic.

100 foot baseline. Quadrats read along baseline. See text for study methods.

LOCATION DESCRIPTION

From Beaver drive 16.3 miles up Beaver Canyon to the turnoff to Big John Flat. Turn left onto this road and continue 3.5 miles to Big John Flat. Continue 1.0 mile to a trail head and park here. The walk from the trail head to the study sites is 2.2 miles with an elevation gain of 1,166 feet. Site #1 is located on the east side of the saddle on a steeper slope. Site #2 is located in the middle of the saddle, west of study #1.



Map name: Delano Peak Study # 1 GPS: NAD 27, UTM 12S 4245914 N 381134 E

Township 28S , Range 4W , Section 19 & 24 Study # 2 GPS: NAD 27, UTM 12S 4245913 N 381079 E

DISCUSSION

Tushar Mountain Goat - Trend Study No. 22R-1 & 2

These studies are located in an alpine community approximately 1/3 mile below Mount Holly at an elevation of 11,500 feet. Two transects were established in 1997 to monitor the effect of mountain goat utilization on the Tushar paintbrush (*Castilleja parvula* var. *parvula*), and to determine if mountain goats were having an effect on this population. The Tushar paintbrush is on the Utah endangered, threatened and sensitive species list and categorized as a federal status 3C species. This listing is defined as "taxa that have proven to be more abundant or widespread than was previously believed, and/or those that are not subject to any identifiable threat" (Atwood et al. 1991). The Tushar paintbrush is an endemic to south-central and west-central Utah in Beaver, Piute, and Garfield counties. It is found growing on alpine ridgetops and talus slopes above timberline on sandy, gravelly soils derived from igneous parent material (Welsh et al. 1993).

Transect 22R-1 was placed in a saddle below Mt. Holly and a second transect (22R-2) was placed downhill several hundred feet from the first. Mountain goats were on the study area in both 2001 and 2003 when the transects were surveyed. Transect 22R-1 is somewhat steep and rocky, dropping off to the east near the end of transect. Transect 22R-2 slopes toward the west at 3-5% and is less rocky. The vegetation in this alpine community is comprised primarily of low growing grasses and forbs. There were no browse species sampled on either of the transects. Grasses and forbs were grouped, while cover and nested frequency data was collected using 20, 1/4 m^2 quadrats read along a 100 foot baseline. Tushar paintbrush density was determined by counting the number of plants rooted within a 100 foot radius circular plot (.72 of an acre). Utilization was estimated on each plant sampled. Mountain goat pellet groups were also counted within the 100 foot radius circular plot.

Table 1 (follows this narrative) summarizes the data collected on transect 22R-1. This study is characterized by moderate vegetation cover, low litter cover, and a high amount of rock and pavement. Bare ground was relatively low in all readings. Perennial grass cover has ranged from 7%-18% over the 3 readings, while perennial forb cover was lowest in 2003 at 15%, and highest in 2001 at 27%. The density of the Tushar paintbrush was estimated at 73 plants/acre in 1997, 88 plants/acre in 2001, and 80 plants/acre in 2003. None of plants sampled in 1997 appeared to have been utilized, but most of the plants in 2001 had been either lightly or moderately used (83%). In 2003, 9% of the plants sampled showed heavy use, but overall use remained light to moderate (75%). Mountain goat pellet groups have increased sharply since the initial reading in 1997. Only 25 goat pellet groups were sampled in 1997, increasing to 56 in 2001 and 160 in 2003.
Table 2 (follows this narrative) summarizes the data collected on transect 22R-2. This transect is characterized by very high vegetation cover, moderate litter cover, with much lower amounts of rock, pavement, and bare ground. Perennial grass cover has ranged from 23%-48%, and was estimated at 36% in 2003. Perennial forb cover was lowest in 2003 at 15%, and highest in 2001 at 27%. The density of the Tushar paintbrush was estimated at 20 plants/acre in 1997, 8 plants/acre in 2001, and 13 plants/acre in 2003. As with 22R-1, none of the plants sampled in 1997 appeared to have been utilized. In 2001, 67% (4 of the 6 plants sampled) showed light use and a single plant showed moderate use. No plants were classified as being heavily used in either year. In 2003, 44% (5 out of 9) of the plants sampled were heavily utilized, while 22% showed moderate use. Thirty-three percent of the plants sampled had either no use or light use in 2003. Seven mountain goat pellet groups were sampled in 1997, increasing to 35 in 2001 and 82 in 2003.

It appears that study 22R-1 is more representative of preferred habitat for the Tushar paintbrush, while study 22R-2 would be best categorized as marginal. An examination of the habitat characteristics of these two transects is important. Study 22R-1 lies in a saddle on the ridgetop and has lower vegetation and litter cover and a higher amount of rock, pavement, and bare ground. As was stated in the 2001 report, paintbrush would have less competition on this transect compared to the lower transect (22R-2) which is located down off of the ridgetop and is composed of a thick, uniform mat of low growing perennial grasses and forbs. Rock,

pavement, and bare ground are much less abundant on transect 22R-2, thus competition between the paintbrush and other low growing species would be much greater. Higher competition results in fewer safe sites being available for the paintbrush to become established. Although mountain goat pellet groups have sharply increased since 1997 and utilization is increasing, use by these animals does not appear to be effecting the paintbrush population. The 2003 paintbrush density estimate on both transects was intermediate to the previous 2 surveys, although the number of pellet groups and level of use were the highest of the 3 readings.

It is our assessment that mountain goat use of the Tushar paintbrush, at least on these 2 transects within the immediate area, are not a threat to the paintbrush population. Furthermore, the amount of ground cover appears to have the most influence on paintbrush density. Thus, areas that are more open and rocky will likely contain more plants compared to areas where vegetation is thick and uniformly distributed. The paintbrush population does not appear to be very competitive and/or abundant where the vegetative and litter cover are relatively high.

Table 1- Data summary for study #22R-1

	1997	2001	2003
% **Cover**			
Vegetation	34.3	38.1	28.3
Litter	3.8	0.8	4.9
Rock - Pavement	74.3	68.9	63.3
Cryptogamic crusts	3.8	-	0.03
Bare ground	8.5	5.1	11.0
Perennial Grasses	7.0	17.7	7.8
Perennial Forbs	16.9	21.7	19.9
Nested Frequency (100 is maximum value)			
Vegetation	85	93	87
Litter	84	50	76
Rock	88	80	75
Pavement	93	94	100
Cryptogamic crusts	36	-	3
Bare ground	74	29	48
Perennial Grasses	61	76	68
Perennial Forbs	79	77	79
Tushar paintbrush (*Castilleja parvula* var. *parvula)*			
Density (plants/acre)	73	88	80
% plants showing:			
No use	100	17	16
Light use	0	54	56
Moderate use	0	29	19
Heavy use	0	0	9
Pellet Groups			
# of goat pellet groups	25	56	160

Table 2- Data summary for study #22R-2

	1997	2001	2003
% Cover			
Vegetation	39.6	76.2	56.1
Litter	13.1	8.8	31.8
Rock - Pavement	46.3	20.3	20.5
Cryptogamic crusts	5.2	0.03	0.4
Bare ground	6.1	0.4	0.4
Perennial Grasses	23.1	48.2	36.0
Perennial Forbs	18.2	26.5	15.0
Nested Frequency (100 is maximum value)			
Vegetation	98	100	98
Litter	92	90	87
Rock	74	38	40
Pavement	89	86	74
Cryptogamic crusts	64	4	9
Bare ground	61	9	16
Perennial Grasses	97	100	96
Perennial Forbs	82	92	83
Tushar paintbrush (*Castilleja parvula* var. *parvula)*			
Density (plants/acre)	20	8	13
% plants showing:			
No use	100	17	22
Light use	0	67	11
Moderate use	0	17	22
Heavy use	0	0	44
Pellet Groups			
# of goat pellet groups	7	35	82